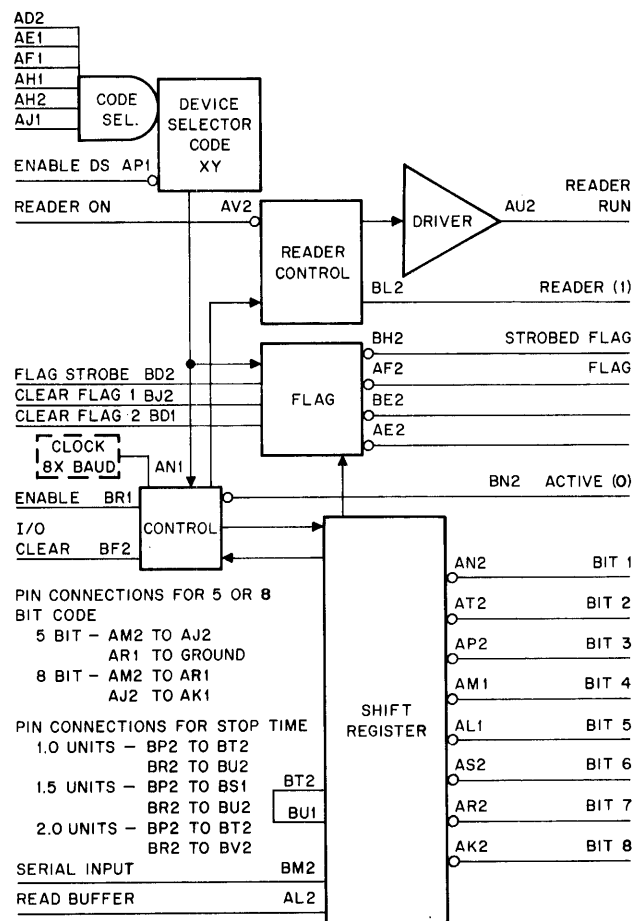


M706 Teletype Receiver

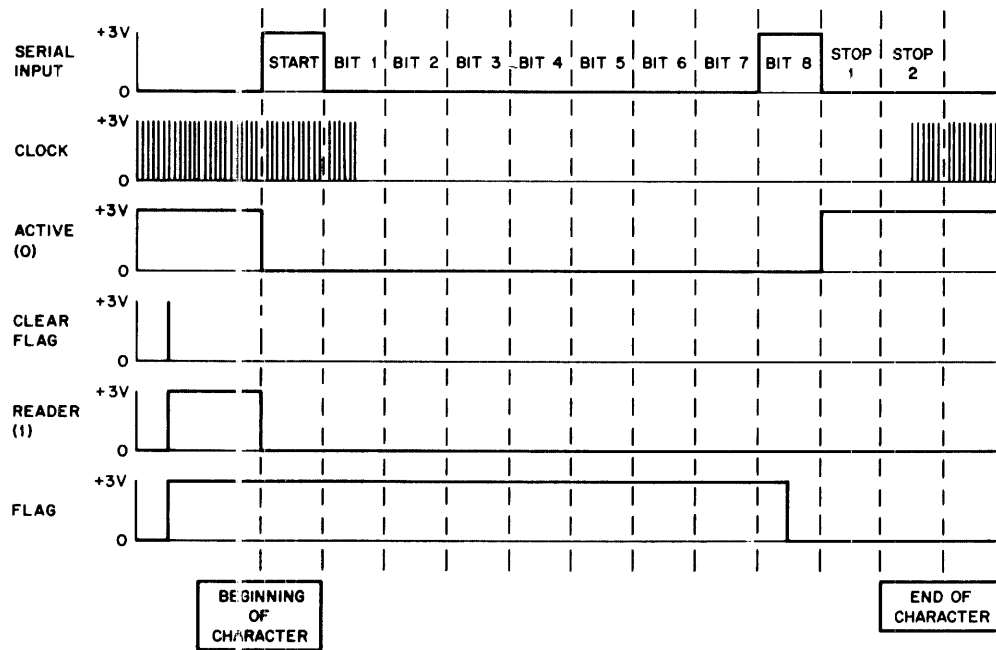
The M706 Teletype Receiver is a serial-to-parallel Teletype code converter self-contained on a double-height module. This module includes all of the serial-to-parallel conversion, buffering, gating, and timing (excluding only an external clock) necessary to transfer information in an asynchronous manner between a serial data line or Teletype device and a parallel binary device. Either a 5-bit serial character consisting of 7.0, 7.5, or 8.0 units; or an 8-bit serial character of 10.0, 10.5, or 11.0 units can be assembled into parallel form by the M706 through the use of different pin connections on the module. In the PDP-15, the Teletype receiver is connected to assemble 8-bit



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M706 Simplified Diagram

characters consisting of 11 units. When conversion is complete, the start and stop bits accompanying the serial character are removed. The serial character is expected to be received with the start bit first, followed by bits 1 through 8 in order, and completed by the stop bits. Coincident with reception of the center of bit 8, the FLAG output goes LOW, indicating that a new character is ready for transmission into the parallel device. The parallel data is available at the BIT 1 through BIT 8 outputs until the beginning of the start bit of a new serial character is received on the SERIAL input (see the timing diagram for additional information).



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M706 Timing Diagram

In addition to the above listed features, the M706 includes the necessary logic to provide rejection of spurious start bits less than 1/2-unit long, and to also provide half-duplex system operation in conjunction with the M707. Device selector gating is also provided; thus, this module can be used on the positive I/O bus of a digital system.

The following are the input, output, and power characteristics of the M706 Teletype Receiver.

- INPUTS:** All inputs present one TTL unit load (except where noted). When input pulses are required, they must have a width of 50 ns or greater.
- CLOCK:** The clock frequency must be eight times the serial input bit rate (baud rate). This input can be either pulses or a square wave. Input loading on the CLOCK line is three unit loads.
- ENABLE:** The ENABLE input, when brought to ground, inhibits reception of new characters. It can be grounded any time during character reception, but returned HIGH only between the time the FLAG output goes to ground and a new character start bit is received at the serial input. When not used, the ENABLE input should be tied to a source of +3V.

I/O CLEAR:	A HIGH level or positive pulse at this input clears the flag and initializes the state of the control. When not used, or during reception, the I/O CLEAR input is grounded.
CODE SELECT Inputs:	When a positive AND condition occurs at the CODE SELECT inputs, the following signals can assume their normal control functions: FLAG STROBE; READ BUFFER; and CLEAR FLAG 1. These inputs are frequently used to multiplex receiver modules when a signal such as READ BUFFER is common to many modules. The inputs are also used for device selector inputs when the M706 is used on the positive I/O bus of a digital system. The CODE SELECT inputs must be present at least 50 ns prior to any of the three signals that they enable. If it is desired to bypass the CODE SELECT inputs, they can be left open and the ENABLE D. S. line tied to ground.
CLEAR FLAG 1:	A HIGH level or positive pulse at the CLEAR FLAG 1 input while the CODE SELECT inputs are all HIGH clears the flag. When not used, this line should be grounded. Propagation delay from input rise until the flag is cleared is a maximum of 100 ns. The flag cannot be set if this input is held HIGH.
CLEAR FLAG 2:	A HIGH level or positive pulse at the CLEAR FLAG 2 input, independent of the state of the CODE SELECT inputs, clears the flag. All other characteristics are identical to those of CLEAR FLAG 1.
FLAG STROBE:	If the flag is set and the CODE SELECT inputs are all HIGH, a positive pulse at the FLAG STROBE input generates a negative-going pulse at the STROBED FLAG output. Propagation delay from the strobe to output is a maximum of 30 ns.
READ BUFFER:	A HIGH level or positive pulse at the READ BUFFER input while the CODE SELECT inputs are all HIGH transfers the state of the shift register to outputs BIT 1 through BIT 8. Final parallel character data can be read by this input as soon as the FLAG output goes to ground. Output data is available a maximum of 100 ns after the rising edge of this input. See the timing diagram for additional information.
READER ON:	A LOW level or ground at the READER ON input turns on the internal reader flip-flop. This element is turned off at the beginning of a received character start bit. The READER ON input can also be pulsed by tying it to one of the signals derived at output pins AE2 or BE2.
SERIAL Input:	Serial data received on the SERIAL input has a logical 0 (space) equal to +3V and a logical 1 (mark) of ground. The input receiver on the M706 is a Schmitt trigger with hysteresis thresholds of nominal 1.0V and 1.7V. This allows the SERIAL input data to be filtered up to 10 percent of bit width on each transition to remove noise. The SERIAL input is diode-protected from voltage overshoot above +5.9V and from voltage undershoot below -0.9V. Input loading is four unit loads.

- OUTPUTS:** All outputs can drive ten unit loads (unless otherwise specified).
- BITS 1 through 8:** A READ BUFFER input signal transfers the shift register contents to those outputs with a received logical 1 appearing as a ground output. If the READ BUFFER input is not present, all outputs are at logical 1. When the M706 is used for reception of 5-bit character codes, the output data appears on output lines BIT 1 through 5; and BITS 6, 7, 8 receive logical zeros.
- ACTIVE (0):** The ACTIVE (0) output goes LOW at the beginning of the start bit of each received character and returns HIGH at the completion of reception of bit 8 for an 8-bit character, or bit 5 for a 5-bit character. Because this signal uses from 0V to +3V (at 1/2-bit time after the FLAG output goes to ground) it can be used to clear the flag through the CLEAR FLAG 2 input while the FLAG output, after being inverted, can strobe parallel data out when connected to READ BUFFER.
- If an M706 and M707 are to be used in half-duplex mode, this output should be tied to the WAIT input of the M707 to inhibit M707 transmission during M706 reception. Output drive is eight unit loads.
- FLAG:** The FLAG output falls from +3V to ground when the serial character data has been fully converted to parallel form. Relative to serial bit positions, this occurs during the center of either bit 8 or bit 5, depending on the respective character length. If the M706 is receiving at a maximum character rate (i.e., one character immediately following another), the parallel output data is available for transfer from the time the FLAG output falls to ground until the beginning of a new start bit. This is stop-bit time plus 1/2-bit time.
- STROBED FLAG:** The STROBED FLAG output is the NAND realization of the inverted FLAG output and FLAG STROBE.
- READER (1):** Whenever the internal reader flip-flop is set by the READER ON input, the READER output rises to +3V. The flip-flop is cleared whenever a start bit of a new character is received on the SERIAL input.
- READER RUN:** The READER RUN output is used with DEC modified 33 ASR and 35 ASR Teletypes that have relay-controlled paper tape readers. The READER RUN output can drive a load of 20 mA at +0.7V. The common end of the load can be returned to any negative voltage not exceeding -20V.
- PIN AE2:** The PIN AE2 output is the logical realization of NOT (CLEAR FLAG 1 or CLEAR FLAG 2 or I/O CLEAR) and is a +3V-to-ground output level or pulse, depending on the input. The signal is used to pulse READER ON for control of READER RUN in the system.
- PIN BE2:** The PIN BE2 output is brought from +3V to ground by an enabled CLEAR FLAG 1 input. It can be connected to READER ON for a different form of control of READER RUN.
- +3 VOLTS** Pin AD1 can drive ten unit loads at a +3V level.
- POWER:** Power dissipation of the M706 is 5W at 400 mA (maximum).